URBDP 404/504: Introduction to Geographic Information Systems (GIS)

Syllabus, Autumn 2018

Meetings	Lecture: Monday 3:30-4:20, Gould 114
	Lab A: Wednesday 3:30-5:20, Gould 007F
	Lab B: Friday, 3:30-5:20, Gould 007F
Instructor	**Boyang Sa**
	Email: boyangsa@uw.edu
	Office: Gould 12C
	Office Hour: Monday 4:30-5:20
TA	**Tianzhe Wang**
	Email: wangtz@uw.edu
	Office Hour: By Appointment
Course Webpage	Available on Canvas
Contact	For simple questions, email is the best way to reach the instructors. We will respond to your email messages within 72 hours. For more involved questions or discussions, please use the office hours.

Course Description

URBDP 404/504 is a hands-on introduction to practical knowledge of Geographical Information Systems and Science designed for students in urban planning and related fields. Maps are a powerful tool for both describing and studying urban issues that occur across space. Lectures and labs will discuss and focus on the elements of effectively creating, analyzing, and presenting maps in urban settings, and all students will be functional in basic GIS skills in the ArcGIS software package, to the point where they can find and manage necessary spatial data, run simple spatial analyses, and present output in maps and data files.

Learning Objectives

- Understand basic concepts and theories of geographic information systems and science, including: spatial reasoning and thinking, spatial data, basic spatial analysis techniques
- Be able to use GIS to create and manage data, perform spatial analysis, communicate spatial analysis process and results through effective writing, creation of maps, and inclusion of descriptive statistics
- Be aware of issues related to data quality and availability, and understand the limitation of GIS and its social implications, and
- Develop spatial and quantitative analysis skills to effectively study issues in a variety of urban settings

Prerequisites

There are no prerequisites for this class. This is an introductory course, but it is helpful if you are familiar with Microsoft Excel or another spreadsheet program. Please note that this course if not for those who have extensive GIS experiences. If you already know some basics of GIS and have done works with GIS, you might want to consider taking URBDP 422/522 (Urban and Regional Geospatial Analysis). If you are interested in more in-depth instruction on specific topics and tools (remote sensing, Python programming, web applications, etc.), there are courses provided in the Departments of Urban Planning, Geography, Forest Resources, and others that would be strong follow-ups to this course.

Required Software and Textbook

The software we will use in the course is ESRI's ArcGIS. You can find desktops with ArcGIS installed in Digital Commons, Gould Hall, or the computer lab in the basement of Suzzallo Library. If you wish to receive a 1-year student copy of ArcGIS, send me an email to obtain activation code and installation instruction. ArcGIS is only available on Windows. If you are a macOS user, you have the following options:

- Work on desktops on campus with ArcGIS installed (Gould Hall and Suzzallo Library);
- CBE Xen (http://www.be.washington.edu/wp-content/uploads/2015/10/CBE_Xen_instructions.pdf) allows you to connect to UW CBE's server on your own computer. The application server has version 10.4.1 of ArcGIS.
- Bootcamp or use virtual machine (Oracle VM Virtualbox, Parallels, etc.)

There is no official textbook for the course. I do, however, encourage you to look up the wealth of free resources available online to get help on GIS learning, especially for beginners who usually don't have a lot of deep questions. Here are some communities in which you may search for your question and get answers easily, or you could post a question and get an answer from experts fairly quickly:

- Before you search online or ask someone else, always search ArcGIS Help. There are extensive resources and help documents that you will find very helpful.
- https://gis.stackexchange.com
- https://community.esri.com

If you prefer a bound book, a hard copy of *Mastering ArcGIS* by Price covers the fundamentals of ArcGIS while leading you to more advanced techniques. *GIS Fundamentals* by Paul Bolstad is also a good alternative. We will be using a number of readings in this class, which will be posted as PDFs via the Canvas website.

Student Assessments

- **Lab Assignments (70%)**
  There will be 9 assignments in total, one each week of class. Each assignment is worth 10-15 points. You will have one week to work on the assignment from the data it is assigned. All assignments should be turned in via the Canvas course website. Late submissions are strongly discouraged. Assignment that are turned in within a week past

the due date will be deducted 10%*(days of lateness); submissions turned in later than one week past due date will not be accepted, except circumstances that are discussed with the instructors. You are encouraged to discuss assignments in groups, but everyone must submit their own original work for credit, including original text, maps, etc. No group submissions are permitted.

- **Policy Memo (30%)**
  The purpose of this assignment is to provide additional experience in collecting, processing and/or analyzing spatial data and should focus on a planning analysis/research problem that require GIS data and spatial analysis to address/analyze the problem. Imagine the mayor and city council ask you to prepare a policy report to address the issue that concerns the residents. The issue could be about health, transportation, food, environment, infrastructure, etc., but it should be an urban planning and public policy issue. Undergraduates are allowed to work in teams, while graduate students are required to work alone. The format of the policy memo should be at least 8 double-space pages, with 12pts fonts. In the memo, at least three maps should be created with GIS and/or spatial analysis. Students are expected to provide a preliminary memo proposal by the date specified in the syllabus.

Disability Resources for Students

If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Academic Integrity

All students are expected to do their own work, and all work submitted for credit must be individual, although students are allowed to work together on labs. Direct quotations of other work should be enclosed with quotation marks with a citation afterward. When you rely substantially on another person's work without quoting from it directly, please use in text citations at the end of an appropriate section.

Course Schedule

	Topic	Assignments due
Week 0 (9/26, 9/28)	Introduction, Overview of GIS	
Week 1 (10/1, 10/3, 10/5)	Data models, vector/raster, attributes, ArcCatalog	
Week 2 (10/8, 10/10, 10/12)	Tables, queries, joins, data classification	Lab #1 due Mon 10/8
Week 3 (10/15, 10/17, 10/19)	Coordinates, projections, datum	Lab #2 due Mon 10/15
Week 4 (10/22, 10/24, 10/26)	Cartographic abstraction and map design	Lab #3 due Mon 10/22
Week 5 (10/29, 10/31, 10/2)	Data sources: metadata, data quality	Lab #4 due Mon 10/29 Memo Proposal due Fri 11/2
Week 6 (11/5, 11/7, 11/9)	Vector spatial analysis	Lab #5 due Mon 11/5
Week 7 (11/12, 11/14, 11/16)	Raster spatial analysis	Lab #6 due Mon 11/12
Week 8 (11/19, 11/21)	Model building	Lab #7 due Mon 11/19
Week 9 (11/26, 11/28, 11/30)	Geocoding, georeferencing	Lab #8 due Mon 11/26
Week 10 (12/3, 12/5, 12/7)	Review	Lab #9 due Mon 12/3
Finals Week		Policy Memo due Mon 12/10